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ENERGY

Professor Thomas JOHANSSON, Director of the Energy and Atmosphere Programme of the United Nations Development Programme (UNDP), discusses a wide range of energy-related issues. He points out that, while most traditional sources of energy such as fossil fuels are expensive and damage the environment, natural gas is an important source of clean energy. Another source of clean and inexpensive energy is wind power. He suggests that cars which generate electricity themselves could be developed to replace cars run by batteries. Professor Johansson also points out that oil resources are limited and eventually will run out. Even so, he believes that nuclear energy should not be considered an alternative safe source of energy; rather, renewable energy sources such as solar energy and biomass should be used on a wider scale, especially in rural areas. He calls on individuals to be aware of energy efficiency when buying appliances. Finally, he discusses the assistance UNDP gives developing countries to build their energy capacities.

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ANNOUNCER: From United Nations Headquarters in New York, this is **World Chronicle**, an unedited interview programme about major global issues. Here now to introduce our guest is the host of today's **World Chronicle**.

LITTLEJOHNS: I'm Michael Littlejohns, and this is **World Chronicle**.

Energy is essential to sustainable economic and social development — to provide an acceptable quality of life for all. But with increasing world population and an expanding global economy, the demand for energy is rapidly intensifying. Current patterns of energy production and consumption continue to damage the environment and harm our health. How can we balance the use of energy with respect for the environment and human health?

Our guest today is a world authority in the field of energy and development. He is Professor Thomas Johansson, Director of the Energy and Atmosphere Programme of the United Nations Development Programme, or UNDP. Joining me to talk with Professor Johansson are John Metzler of the USA Radio Network and Walter Pfaeffle of the Kuwait News Agency.

Professor Johansson, welcome to World Chronicle.

Professor, in some of the documentation that was prepared for us for this programme, I noticed that you say that energy efficiency opportunities are presently utilized only to a limited degree in all countries. This presumably means the United States, Sweden, and the developing countries. Why is it, given the fact that the sources of energy that are most prevalent now are not infinite, that there is not more being done to include efficiency? Are Governments simply asleep at the switch, or what?

JOHANSSON: Well, it varies between countries. There is considerable interest in improving the efficiency of energy use in many countries. But it's not so easy, because energy represents a small part of the total cost in situations where energy is being purchased and used, and, furthermore, in many countries there are subsidies to energy supply, which means that the price of energy is lower than the costs, especially if you include the environmental concerns and the environmental costs. Then, if you look at what you can do about this, there is an information problem. People don't know about the opportunities. And there are also barriers sometimes that are direct. For example, if you rent an apartment, you have no incentive to invest in energy efficiency, and the landlord, from whom you rent the apartment, recovers his expenses anyway, for energy. So there are many aspects here that need to be addressed.

LITTLEJOHNS: Do you believe that there should be greater use of non-fossil sources of energy, particularly for the generation of electricity and for heating?

JOHANSSON: Yes, I think there should be considerably increased use of other sources of energy than fossil. I think the problem with fossil fuel comes in many dimensions.

It has to do with urban air pollution, it has to do with acidification regions, it has to do with the climate change problem – and all of these suggest that you should try to use other sources of energy. This is not to say that, over time, these fossil fuel resources should not be used; it is, to a large degree, a matter of the rate at which these sources are used and the way in which they are used.

LITTLEJOHNS: There's a good deal of natural gas, which is a fairly clean energy source. Why is natural gas not being used more in automobiles, for example?

JOHANSSON: I think that is essentially an historical fact. You haven't been interested in using natural gas in automobiles for a long time; there is a difficulty in the distribution, which doesn't exist in many countries; and there hasn't been a push for doing it, for making use of natural gas in this particular area. I think natural gas, over time, is a very important transition fuel to a much cleaner energy system than we have today, and you should try to use more natural gas in the world – not necessarily in transportation with internal combustion engine vehicles, but with the next generation of vehicle technology.

PFAEFFLE: So why isn't this being recognized by the major car companies? You see, for instance, the American car companies, they're spending enormous amounts of money to develop the electrical car, yet natural gas would be so much better, more environmentally acceptable fuel. Why is not more effort being concentrated on natural gas?

JOHANSSON: I think the ultimate vehicle technology is an electric car, but the trick here is to have the power plant in the car, not to rely on the very large batteries, which is the barrier for this technology at present. But it's very interesting to see that new technologies for producing the electricity in the vehicle are becoming available. And of particular interest is what's called fuel cell technologies, which in the vehicle produce electricity without any pollutants at all. And the natural gas contribution here I think would be to be the source of the hydrogen that is required to use fuel cells. And this would, in combination, offer the possibility of a very clean transportation system.

LITTLEJOHNS: So this would also make a much lighter automobile, because one of the problems now with electric cars is the huge weight of lead batteries, is it not?

JOHANSSON: Yes. The battery is a very heavy one, and in an automobile a battery would be five hundred to several more hundred kilos. And that would be reduced considerably, not to the size of today's batteries, of course, but not much above the present size.

PFAEFFLE: And also disposing of the battery is not environmentally very healthy, is it?

JOHANSSON: Well, of course you would reuse and recycle the material. This is a general principle that should be adhered to much more than is the case world-wide. Recycling is the key thing here.

METZLER: Wouldn't you say that it really takes a crisis often to galvanize the international community, and indeed the business community, to want to address a problem? The oil boycott in the early 1970s brought the car producers to say that the days of the gas guzzling cars were to go the way of the proverbial dinosaur. Don't you think it's the same way now, that a car does get the proverbial better mileage, the refrigerator does use less electric, the light bulb uses less electric? Wouldn't you say, then, an incentive, and a private sector incentive, is really the name of the game, be it with a fossil fuel or natural gas or wind or whatever?

JOHANSSON: Well, an incentive is, of course, always helpful, because few things develop by themselves. And I think there's a great role for Governments to play in identifying the areas where new technology can make a considerable difference, and then give temporary performance stimulation – not the permanent subsidies that you often see today just to lower energy costs; that is, by and large, very destructive. But giving targeted incentives to bring new technology into the marketplace, that I think is a key area to be concerned about.

METZLER: And thus the efficiency.

JOHANSSON: I beg your pardon?

METZLER: Thus the efficiency.

JOHANSSON: That's one of the areas, but it's also technologies like fuel cell vehicles, for example; like wind power in many areas, and so forth.

PFAEFFLE: Is it correct to say that the oil crisis of the 1970s has led to greater efficiency in the industry? Heavy industry, for instance? The steel industries?

JOHANSSON: I think it's correct to say that it has helped. But I think there are many ways in which you can get a new energy system into the world, and it's not a must that you have a major crisis. But I think it is a must that you have major attention being paid to it. And this attention can originate in many of the problems that are linked to the use of energy: like climate change; like acidification and the destruction of soils; like urban air pollution, which is a major concern in the mega-cities of the world. And it's deteriorating.

LITTLEJOHNS: Your country, Sweden, Professor Johansson, I think relies to a great extent on nuclear energy. Do you think that greater use should be made of nuclear energy? Here in the United States, as you know, there's been practically no development of nuclear energy in the last few years because of concerns about the environment and the

safety of the whole system. Is that perhaps an exaggerated concern? Do you think that more should be done in nuclear energy?

JOHANSSON: I don't think that it is exaggerated. And you should also remember that Sweden has a decision to phase out nuclear energy in total, because of the concerns that have arisen around nuclear energy.

LITTLEJOHNS: But at the present time you're relying –

JOHANSSON: At the present time there is a large contribution from nuclear electricity. It's important, I think, to note that, in the recent evaluation that was done by the Intergovernmental Panel on Climate Change with respect to what can be done in the energy supply system to reduce emissions of carbon dioxide, nuclear was one of the alternatives that were assessed; but it was found that there are many ways in which you can reduce these emissions, that you do not have to rely on nuclear energy to create a climate-friendly energy system.

PFAEFFLE: Looking into the next century, how do you assess the chances of nuclear energy? Do you think it's going down, up? What is the –

JOHANSSON: I think the alternatives that exist essentially in the renewable energy area are so attractive that they will take over. And I think this attractiveness comes about because there are no risks with reactor accidents; there is no nuclear waste to deal with; there is no linkage to nuclear weapons proliferation. And renewable energy has a very great advantage – when it comes to biomass energy, modernized biomass energy, which is the key part here – and the advantage is that you create jobs. You create jobs in rural areas in large quantities. For example, the ethanol programme in Brazil has generated about 700,000 rural jobs. This is a key benefit that comes in addition to providing the energy.

PFAEFFLE: But how about a country like France? How would they handle a de-nuclearization policy? I mean, they have nuclear reactors all over the country.

JOHANSSON: It's a matter of looking at it over a period of time. And I'm not saying that nuclear should play no role whatsoever. And then it depends on the specific situations of the country. And I will say that in France, for example, there is a big problem with the agricultural sector, which could, to a large extent, be handled by using bio-energy; that is, you grow biomass for energy purposes, and then you use modern technology to convert it into liquid fuels and electricity.

METZLER: So that this is something that can realistically work in the next century. Tell me this, Professor: Do you think that 20 years from now, as the proverbial ball-park figure, wind technology, or even LNG [liquefied natural gas], or many of the alternatives to nuclear or fossil fuels will be playing a major role in, say, North America or Western Europe as an energy source? 20 per cent, 25 per cent?

JOHANSSON: I would say that we already see wind energy being economically competitive in windy areas. And this has been shown in several parts of the world. If you look at the wind resource in, for example, North America, it's a very large resource which could provide many times the present US electricity generation at costs that are comparable to costs of conventional sources of electricity. So I think what you see in regions like Europe and the United States at present is a situation where the energy systems have already been built; there's not much growth. The action in the energy area takes place in the developing countries, countries like India, China, Brazil and so forth, where very large investments go on. So this is where most of this action can be expected, and there's a very large interest in these countries to move to these new opportunities.

PFAEFFLE: I drove through southern California once and I saw huge fields of idle windmills. Are you familiar with those? And why?

JOHANSSON: Well, this is an important question. Yes, wind energy, of course, like solar energy, generates electricity when you have the wind. However, the wind contribution comes as part of a system. And there's a variation in the wind. There's also a variation on the demand side.

PFAEFFLE: You mean that California has put up these windmills without thinking about the wind?

JOHANSSON: No, no, of course not. This is well known. And as you build your system, you build it to handle the situations. So you have other sources of generating capacity that chip in when the wind is not blowing. You can have hydropower, for example – you save the water in the dam; you can have a thermal station, where you save the fuel; and taken together, this works with the reliability that you are accustomed to.

LITTLEJOHNS: This is **World Chronicle**. Our guest is Professor Thomas Johansson, Director of the Energy and Atmosphere Programme of UNDP.

Another alternative source of energy, Professor, I believe, is from the tides. How much research has been done into that possibility?

JOHANSSON: I beg your pardon, from...?

LITTLEJOHNS: From the tides, the ocean tides.

JOHANSSON: There has been some research in this, and by and large the conclusion has been that this is a small source of energy, small potential source of energy, with technology that is sort of being envisioned. And the costs are likely to be quite high, except for very special locations.

LITTLEJOHNS: Which alternative source of energy would you say holds the greatest promise? Photovoltaics, windmills, what?

JOHANSSON: At present I would say that windmills and biomass are the two most important sources for industrialized areas. And technology is here either already, totally ready to go in a competitive fashion, or very close to becoming so. If you look at photovoltaics – that is, solar electricity from panels – this is a very important area as well, and in developing countries this is now competitive for decentralized rural electrification. And it's a very important insight that has been gained over the last several years that if you can provide consumer credits to people to buy solar home systems, they can afford to buy these very capital-intensive and expensive systems. And they have monthly payments that are comparable to or lower than what is now being paid for kerosene and candles. This is a breakthrough. But to have this expand in a large fashion in the world means that you have to find ways to break through the barriers to dissemination that now exist.

LITTLEJOHNS: And the panels of course also have a very long lifespan. I mean, they could last 50 years I believe, maybe longer.

JOHANSSON: Well, no one knows about that time-span, but certainly they have a long lifespan.

LITTLEJOHNS: Well, I mean, theoretically they could last at least 50 years.

JOHANSSON: Yes. Well, a long time, yes. But these consumer credits are sort of typically paid back not in those time-frames but in three, four, five years.

METZLER: Addressing the current problem, Professor, a country like China or India is really destroying its environment. Vaclav Smil, who wrote the book *The Bad Earth*, said that China is basically not only destroying its atmosphere but also destroying its forests; desertification is a bane of the land. What about a country like China that abuses fossil fuels? What can UNDP realistically do to help reverse that tide, which is presently taking place?

JOHANSSON: Well, there is a lot of concern in China about the energy situation. China has a major programme to improve energy efficiency, and they have really accomplished a lot over the last 15 years. There is a large interest in renewable energy in China. And I think what UNDP can do is to be supportive in various fashions in this respect. Perhaps the most important function is to help identify and create demonstration projects that bring new technologies to the development of China. There is such an investment rate in that country that if you can build the new China with technologies of the next generation, that makes a very large difference. And this is what UNDP can help accomplish.

PFAEFFLE: The misuse or abuse of energy is happening right here in this country, in the United States, or in the Western world, with the automobile. I mean, we see an increased use of gasoline. The United States has the lowest gasoline taxes. Do you think

raising the gasoline taxes would help conserve energy? Are you doing something in that field to encourage the US Government to push for higher energy taxes?

JOHANSSON: I think it would help somewhat, yes. But I think a lot more can be done than you would accomplish.... If you compare, say, Europe to the United States, Europe essentially has better automobile fuel efficiency, but it's not a dramatic difference. But the price is different by, say, a factor of two. So you would really have to go to extremely high taxes to, for example, force a new vehicle fuel system into the world. I think you have to go other ways to accomplish the major changes that we now know can happen because technology is essentially there at comparable or competitive costs. But to get this whole process of changing to a new system going is an undertaking that requires much more than increased gasoline taxes.

PFAEFFLE: Apart from the automobile, what would you recommend to, let's say, the consumer to do to conserve energy in our homes and so on?

LITTLEJOHNS: Turn off the lights when you leave the room.

[LAUGHTER]

JOHANSSON: That would make some difference, but not a major difference. I think the most important is probably to be aware about the energy performance of the appliances and other capital goods that you acquire, and keep asking for it, asking for energy-efficient refrigerators, for example, energy-efficient air conditioners, and so forth. And there's a very large –

LITTLEJOHNS: Fluorescents instead of incandescents?

JOHANSSON: In many applications, yes.

LITTLEJOHNS: In China that's what they have everywhere. Nearly all the lighting seems to be fluorescent there.

JOHANSSON: There's a whole lot of it. And they manufacture these fluorescent light bulbs in China. And the opportunity in a country like China of course is that most of the light bulbs that will be there will be sort of coming in. It's not that the country has a large capital stock of fixtures and arrangements and all that. All of this is to come new. It should come with the right technology in the first place. And this recognition is spreading around, I think.

PFAEFFLE: There's a big building, the Citibank, Citicorp building in New York that has a roof, a slanted roof that was supposed to at one time collect enough solar energy to heat the whole building, but what happened to that?

JOHANSSON: I don't know what happened to that.

PFAEFFLE: Is that a good idea, to –

LITTLEJOHNS: I think they gave up on the idea because they didn't think it was economically feasible.

JOHANSSON: Well, typically, a building like that doesn't need heating, because there's so much internal heat being generated – from lights, from appliances and computers and so forth – they need cooling. And what is now happening is that by reducing the heat generation in buildings you also reduce the air conditioning needs. So there is a synergy here between energy efficiency and reduced demand for things like air conditioning.

LITTLEJOHNS: Professor, you're the head of the Energy and Atmosphere Programme of UNDP. Tell us a bit about your investigations into the effects of current energy uses on the atmosphere.

JOHANSSON: Well, as you know, the Intergovernmental Panel on Climate Change recently published an assessment of the climate issue that concluded that human activities are now changing the atmosphere. Exactly what this means is a bit unclear, but several studies have been done on what you do to mitigate by reducing the emissions of these so-called greenhouse gases. The most important sector for the emission of greenhouse gases is the energy sector, by far. And if you look at the source of this, it's the fossil fuels that presently make up more than three-quarters of the world's energy. So if you want to change that, it means that you have a major change in the world's energy system ahead of you. And this recognition is something we help draw attention to, and also to talk about what can actually be done without incurring large costs. There are two major avenues, as we have already mentioned: more efficient use of energy and more renewable sources of energy.

METZLER: Well, Professor, this is going to take major political decisions to literally change the structure of the world energy systems in major countries. I mean, how does UNDP fit into that? You present them obviously with a very good case, but it's up to Governments, alas, to make the decision to say, yes, we will do this.

JOHANSSON: Well, I think it's perhaps more a matter of what the private sector will be doing. I don't think you will have a political decision that says, yes, we will now change the world's energy system. I think it's a gradual process where new technologies will be coming in as they become developed and competitive. I think Governments have a very important role in stimulating the development and the early phases of new technologies. Unfortunately, Government energy R&D is going down, and unfortunately it's going into areas that are not crucial for the coming energy transition. So there are a lot of things that Governments can worry about that have a reasonable scale and a reasonable size of the consequences of the decisions.

PFAEFFLE: Professor, one quick question about oil. Do you believe the age of oil as a major fuel is coming to an end?

JOHANSSON: I believe the oil resources of the world are limited. And in that sense, yes, oil will come to an end, but I think it's going to take a long time before that happens. I think there's a good case to be made for climate change reasons that the oil that is there should not be used up sort of instantly, that it's something that should be spread out over a considerable period of time.

PFAEFFLE: Would higher prices help?

JOHANSSON: Higher prices would help, sure, but I think that's a minor factor in this. Because energy – if you look at the activities where energy is being used, the cost of the energy is not a major part of the total cost. Even if you doubled the prices, it's still going to be a small part of the total cost. So it doesn't affect the consumer very much. And so the focus in the energy sector on prices has some justification, but it's too limited an approach to accomplish change.

LITTLEJOHNS: What is UNDP doing, what advice is UNDP giving, particularly to developing countries, on energy, how they should – what their energy policies should be?

JOHANSSON: UNDP is not advising in that sense; UNDP is sort of bringing some elements to the discussion with the suggestion that they be evaluated by the country, depending on the objectives of the Government and the people of the country. And there are four areas where UNDP is trying to be supportive in that sense. One is capacity-building, where people need to exist in a country to be able to evaluate the issues and the opportunities; the second is framework issues, the regulatory and legislative system that governs especially what the private sector is doing; the third area is demonstration projects of the key technologies – renewables and energy efficiency; and the fourth area is to support countries in developing national energy action programmes so that there is some linkage between the objectives of the country and the specific measures that are being considered.

LITTLEJOHNS: Professor Johansson, that's all the time we have. Thank you for being with us on this edition of **World Chronicle**. Our guest has been Professor Thomas Johansson, Director of the Energy and Atmosphere Programme of the United Nations Development Programme. He was interviewed by John Metzler of USA Radio Network and Walter Pfaeffle of the Kuwait News Agency. I'm Michael Littlejohns. Thank you for joining us. We invite you to be with us for the next edition of **World Chronicle**.

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